

Roll No.

MSCPHY-12 (M.Sc. PHYSICS)
Second Year Examination-2015

PHY-554

**Microwave Devices and
Communication System**

Time : 3 Hours

Maximum Marks : 60

Note : This paper is of sixty (60) marks divided into three (03) sections A, B, and C. Attempt the questions contained in these sections according to the detailed instructions given therein.

Section - A

(Long Answer Type Questions)

Note : Section 'A' contains four (04) long-answer-type questions of fifteen (15) marks each. Learners are required to answer any two (02) questions only. (2×15=30)

1. Define circular wave guide and give its characteristics.
2. What is S matrix ? Discuss the scattering matrix formulations.
3. Explain the working of magnetron.
4. What is modulation ? Deduce an expression indicating frequency spectron of FM wave.

Section - B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short-answer-type questions of five (05) marks each. Learners are required to answer any four (04) questions only. (4×5=20)

1. Explain the operating principle and construction of TRAPATT diode.
2. What is the principle of operation of a travelling wave tube.
3. Compare Amplitude and Frequency modulation.
4. Explain the principle of square law detection and its derivation.
5. What is antenna theorem ?
6. What is directivity. Derive an expression for directivity.
7. Discuss the working of basic RADAR system and mention the application of RADAR.
8. Derive an expression for beam width and directivity.

Section - C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective-type questions of one (01) mark each. All the questions of this section are compulsory. (10×1=10)

Write true or false against the following:

1. The velocity of propagation (group velocity) of a signal in a waveguide is lower than in free space.

2. Wave guide are used for the transmission of d.c. power from one point to another.
3. Hybrid ring is also called as rat race ring.
4. An isolator is four part microwave device.
5. A tunnel diode under low forward bias exhibits negative resistance.

Choose correct alternative:

6. Tunnel diode can be used as -
 - (a) Microwave detector
 - (b) Microwave amplifier
 - (c) Microwave tube
 - (d) Antenna
7. The main purpose of modulation is to :
 - (a) Combine two wave of different frequencies.
 - (b) achieve wave shaping of the carrier wave
 - (c) transmit low frequency information over long distance
 - (d) produce side band
8. 100% modulation is possible in AM when carrier
 - (a) frequency equal to signal frequency
 - (b) frequency exceeds signal frequency
 - (c) amplitude equal to signal amplitude
 - (d) amplitude exceeds signal amplitude

9. In FM when frequency deviation is doubled -
- (a) modulation is doubled
 - (b) modulation is halved
 - (c) carrier swing is half
 - (d) modulation index is decreased
10. A PN Junction that operates in avalanche region is called -
- (a) Gun diode
 - (b) Tunnel diode
 - (c) Impatt diode
 - (d) Varactor